CLAIMS:

1. An integrated circuit package separator for separating integrated circuit packages from a board comprising a plurality of integrated circuits bonded thereto, the board having a plurality of holes extending within it, the separator comprising:

a base having a plurality of pins extending upwardly therefrom;

a support over the base and having an upper surface, the support having a plurality of holes extending therethrough, the pins extending through the holes and upwardly beyond the upper surface of the support; the support and pins being configured such that the pins extend into the holes in the board when the board is placed over the support upper surface;

an actuator beneath the support and configured to vertically displace the support and lift the support off the pins; and

a cutting mechanism configured to cut the board while the board is over the support upper surface and thereby separate the integrated circuit packages from one another.

2. The separator of claim 1 wherein the pins align with the board such that each of the separated integrated circuit packages is retained to the support by at least one pin.

3. The separator of claim 1 wherein the pins align with the board such that each of the separated integrated circuit packages is retained to the support by at least two pins.

4. The separator of claim 1 wherein the support is a sheet comprising aluminum and having a thickness of at least 3/16 inches.

5. The separator of claim 1 wherein the actuator is pneumatically powered.

6. The separator of claim 1 wherein the actuator is coupled to the support through a lift member, the lift member having a substantially planar upper surface and the base having a substantially planar upper surface, the lift member substantially planar upper surface being substantially flush with the base substantially planar upper surface.

7. The separator of claim 1 wherein the actuator is coupled to the support through a lift member, the lift member having at least one post extending upwardly therefrom, the at least one post extending through a hole in the support.

8. The separator of claim 1 wherein the actuator is coupled to the support through a lift member, the lift member having at least two posts extending upwardly therefrom, the at least two posts extending through holes in the support and aligning the support relative to the lift member.

9. The separator of claim 1 wherein the actuator is pneumatically powered; the actuator comprising a pair of gas ports, one of the ports being a gas inlet when the actuator lifts the support and the other port being a gas outlet when the actuator lifts the support; the separator further comprising at least one pressure release valve in fluid communication with the gas outlet.

10. An integrated circuit package separator for separating integrated circuit packages from a board comprising a plurality of integrated circuits bonded thereto, the board having a plurality of holes extending within it, the separator comprising:

a base having a plurality of pins extending upwardly therefrom;

a support over the base and having an planar surface, the support having a plurality of holes extending therethrough and a pair of opposing ends, the pins extending through the holes and upwardly beyond the upper surface of the support; the support and pins being configured such that the pins extend into the holes in the board when the board is placed over the support upper surface;

a pair of actuators beneath the support and configured to vertically displace the support and lift the support off the pins; and

a cutting mechanism configured to cut the board while the board is over the support planar surface and thereby separate the integrated circuit packages from one another.

11. The separator of claim 10 wherein the pins align with the board such that each of the separated integrated circuit packages is retained to the support by at least one pin.

12. The separator of claim 10 wherein the pins align with the board such that each of the separated integrated circuit packages is retained to the support by at least two pins.

13. The separator of claim 10 wherein the actuators are pneumatically powered.

14. The separator of claim 10 wherein the actuators are coupled to the support through first and second lift members, respectively; the lift members having substantially planar upper surfaces and the base having a substantially planar upper surface, the substantially planar upper surfaces of the lift members being substantially flush with the base substantially planar upper surface.

15. The separator of claim 10 wherein the actuators are coupled to the support through first and second lift members, respectively; at least one of the lift members having at least one post extending upwardly therefrom, the at least one post extending through a hole in the support.

16. The separator of claim 10 wherein the actuators are coupled to the support through first and second lift members, respectively; the first and second lift members each having at least one post extending upwardly therefrom, the posts extending through holes in the support.

17. The separator of claim 10 wherein the actuators are coupled to the support through first and second lift members, respectively; the first and second lift members each having at least two posts extending upwardly therefrom, the posts extending through holes in the support.

18. The separator of claim 17 wherein the posts are tapered, the tapered posts being wider at the base than above the base.

19. The separator of claim 10 wherein the actuators are pneumatically powered; the actuators each comprising a pair of gas ports, one of each pair of ports being a gas inlet when the actuator lifts the support and the other port of each pair of ports being a gas outlet when the actuator lifts the support; the separator further comprising at least one pressure release valve in fluid communication with the gas outlets.

20. The separator of claim 10 wherein the actuators are pneumatically powered; the actuators each comprising a pair of gas ports, one of each pair of ports being a gas inlet when the actuator lifts the support and the other port of each pair of ports being a gas outlet when the actuator lifts the support; the separator further comprising at least two pressure release valves, one of the pressure release valves being in fluid communication with one of the gas outlets, and an other of the pressure release valves being in fluid communication with the other of the gas outlets.

21. The separator of claim 10 wherein the actuators comprise a first actuator proximate one of said opposing ends and a second actuator proximate the other of said opposing ends.

22. An integrated circuit package separator for separating a plurality of integrated circuit packages from one another, the integrated circuit packages being provided as integrated circuit chip components joined to a board, the separating including cutting the board, the separator comprising:

a panel;

a plurality of blocks over the panel, the blocks having upper surfaces and being configured to support the board while leaving the integrated circuit chip components extending between the block upper surfaces and the panel; and

a cutting mechanism configured to cut the board while the board is supported on the blocks and to thereby separate the integrated circuit packages from one another.

23. The separator of claim 22 wherein the panel is fastened to the support.

24. The separator of claim 22 wherein components have a thickness and the blocks have a thickness about equal to that of the components.

25. The separator of claim 22 wherein at least some of the components have a common thickness and the blocks have a thickness about equal to said common thickness.

26. The separator of claim 22 wherein the blocks are in a one-to-one correspondence with the integrated circuit packages on the board.

27. The separator of claim 22 comprising more than one panel over the support, each panel having blocks associated therewith.

28. The separator of claim 27 wherein the each of the panels and blocks associated therewith is a panel and block assembly, the panel and block assemblies all being identical to one another.

29. The separator of claim 22 wherein the blocks are fastened to the panel.

30. The separator of claim 22 wherein the blocks are one-piece with the panel.

31. The separator of claim 22 further comprising pins extending upwardly from beneath the panel to beyond an upper surface of the panel, the pins configured to extend into the board and retain the board over the panel.

32. The separator of claim 31 wherein the pins do not extend through the panel.

33. The separator of claim 31 further comprising an actuator beneath the panel and configured to vertically displace the panel.

34. The separator of claim 33 wherein the actuator is pneumatically powered.

35. An integrated circuit package separator for separating integrated circuit packages from a board comprising a plurality of integrated circuit components bonded thereto, the components extending outwardly from the board, the board having a plurality of holes extending within it, the separator comprising:

a base having a plurality of pins extending upwardly therefrom;

a support over the base and having an upper planar surface, the support having a plurality of holes extending therethrough and a pair of opposing ends, the pins extending through the holes and upwardly beyond the upper planar surface of the support; the support and pins being configured such that the pins extend into the holes in the board when the board is placed over the support upper planar surface;

a pair of actuators beneath the support and configured to vertically displace the support and lift the support off the pins, the actuators comprising a first actuator proximate one of said opposing ends and a second actuator proximate the other of said opposing ends;

a panel over the support;

a plurality of blocks over the panel, the blocks having upper surfaces and being configured to support the board while leaving the integrated circuit chip components extending between the block upper surfaces and the panel; and

a cutting mechanism configured to cut the board while the board is over the panel and to thereby separate the integrated circuit packages from one another.

36. The separator of claim 35 wherein the pins align with the board such that each of the separated integrated circuit packages is retained to the support by at least one pin.

37. The separator of claim 35 wherein the pins align with the board such that each of the separated integrated circuit packages is retained to the support by at least two pins.

38. The separator of claim 35 wherein the actuators are pneumatically powered.

39. The separator of claim 35 wherein the actuators are coupled to the support through first and second lift members, respectively; the lift members having substantially planar upper surfaces and the base having a substantially planar upper surface, the substantially planar upper surfaces of the lift members being substantially flush with the base substantially planar upper surface.

40. The separator of claim 35 wherein the actuators are coupled to the support through first and second lift members, respectively; at least one of the lift members having at least one post extending upwardly therefrom, the at least one post extending through a hole in the support.

41. The separator of claim 35 wherein the actuators are coupled to the support through first and second lift members, respectively; the first and second lift members each having at least two posts extending upwardly therefrom, the posts extending through holes in the support.

42. The separator of claim 41 wherein the posts are tapered, the tapered posts being wider at the base than above the base.

43. The separator of claim 35 wherein the actuators are pneumatically powered; the actuators each comprising a pair of gas ports, one of each pair of ports being a gas inlet when the actuator lifts the support and the other port of each pair of ports being a gas outlet when the actuator lifts the support; the separator further comprising at least one pressure release valve in fluid communication with the gas outlets.

44. The separator of claim 35 wherein the actuators are pneumatically powered; the actuators each comprising a pair of gas ports, one of each pair of ports being a gas inlet when the actuator lifts the support and the other port of each pair of ports being a gas outlet when the actuator lifts the support; the separator further comprising at least two pressure release valves, one of the pressure release valves being in fluid communication with one of the gas outlets, and an other of the pressure release valves being in fluid communication with the other of the gas outlets.

45. The separator of claim 35 wherein the actuators comprise a first actuator proximate one of said opposing ends and a second actuator proximate the other of said opposing ends.

46. The separator of claim 35 wherein the panel is fastened to the support.

47. The separator of claim 35 wherein the blocks are in a one-to-one correspondence with the integrated circuit packages on the board.

48. The separator of claim 35 comprising more than one panel over the support, each panel having blocks associated therewith.

49. The separator of claim 35 wherein the blocks are fastened to the panel.

50. The separator of claim 35 wherein the blocks are one-piece with the panel.

51. The separator of claim 35 wherein the pins do not extend through the panel.

52. A method of forming integrated circuit packages, comprising:

providing a panel over a support;

providing a plurality of blocks extending upwardly from the panel, the blocks having upper surfaces;

providing a board having a plurality of integrated circuit components bonded thereto, the integrated circuit components extending outwardly from the board and forming a plurality of integrated circuit packages across the board;

placing the board over the panel, the block upper surfaces supporting the board while leaving the integrated circuit components extending between the block upper surfaces and the panel;

while the board is over the panel, cutting the board to separate the integrated circuit packages from one another.

53. The method of claim 52 wherein the providing the panel over the support comprises fastening the panel to the support.

54. The method of claim 52 wherein the blocks are provided in a one-to-one correspondence with the integrated circuit packages.

55. The method of claim 52 comprising providing more than one panel over the support, each panel having blocks associated therewith.

56. The method of claim 55 wherein the providing a board comprises providing separate boards over the separate panels.

57. The method of claim 55 wherein the each of the panels and blocks associated therewith is a panel and block assembly, the panel and block assemblies all being identical to one another.

58. The method of claim 52 wherein the providing the blocks comprises fastening the blocks to the panel.

59. The method of claim 52 wherein the blocks are one-piece with the panel.

60. The method of claim 52 further comprising providing pins extending upwardly from beneath the panel to beyond an upper surface of the panel, the pins extending into the board to retain the board over the panel.

61. The method of claim 60 wherein the pins do not extend through the panel.

62. The method of claim 52 further comprising:

providing an actuator beneath the panel; and

after the cutting, vertically displacing the panel by the actuator.

63. The method of claim 52 further comprising:

providing pins extending upwardly from beneath the panel to beyond an upper surface of the panel, the pins extending into the board to retain the board over the panel;

providing an actuator beneath the panel; and

after the cutting, vertically displacing the panel by the actuator to release the cut board from the pins.

64. The method of claim 52 further comprising:

providing pins extending upwardly from beneath the panel to beyond an upper surface of the panel, the pins extending into the board to retain the board over the panel, the pins and board aligning such that each of the separated integrated circuit packages is retained to the support by at least one pin;

providing an actuator beneath the panel; and

after the cutting, vertically displacing the panel by the actuator to release the separated integrated circuit packages from the pins.

65. A method of forming integrated circuit packages, comprising:

providing a base having a plurality of pins extending upwardly therefrom;

providing a support over the base, the support having an upper surface and a plurality of holes extending therethrough, the pins extending through the holes and upwardly beyond the upper surface of the support;

providing an actuator beneath the support;

providing a board having a plurality of integrated circuits bonded thereto, the integrated circuits forming a plurality of integrated circuit packages across the board, the board having a plurality of holes extending therethrough;

placing the board over the support upper surface, the pins extending into the holes in the board;

while the board is over the support upper surface, cutting the board to separate the integrated circuit packages from one another; and

after the cutting, displacing the support by the actuator to lift the support and cut board off the pins.

66. The method of claim 65 further comprising, after the displacing, removing the separated integrated circuit packages from over the support.

67. The method of claim 65 wherein the pins and board align such that each of the separated integrated circuit packages is retained to the support by at least one pin, the displacing releasing the separated integrated circuit packages from the pins.

68. The method of claim 65 wherein the pins and board align such that each of the separated integrated circuit packages is retained to the support by at least two pins, the displacing releasing the separated integrated circuit packages from the pins.

69. The method of claim 65 wherein the pins and board align such that each of the separated integrated circuit packages is retained to the support by at least one pin, the displacing releasing the separated integrated circuit packages from the pins; the method further comprising, after the displacing, removing the separated integrated circuit packages from over the support.

70. The method of claim 65 wherein the actuator is pneumatically powered and the displacing the support comprises forcing gas into the actuator.

71. A method of forming integrated circuit packages, comprising:

providing a base having a plurality of pins extending upwardly therefrom;

providing a support over the base, the support having an upper planar surface and a pair of opposing ends, the support having a plurality of holes extending therethrough, the holes aligning with the pins, the pins extending through the holes and upwardly beyond the upper planar surface of the support;

providing a pair of actuators beneath the support, a first of the actuators being proximate one of the opposing ends and an other of the actuators being proximate the other of the opposing ends;

providing a board having a plurality of integrated circuits bonded thereto, the integrated circuits forming a repeating pattern of integrated circuit packages across the board, the board having a plurality of holes extending therethrough;

placing the board over the support upper planar surface, the pins extending into the holes in the board;

while the board is over the support upper planar surface, cutting the board to separate the integrated circuit packages from one another; and

after the cutting, vertically displacing the support by the actuators to lift the support off the pins, the vertically displacing comprising lifting both ends of the support substantially simultaneously and substantially in

unison, the support upper planar surface remaining substantially level as the support is lifted off the pins by the actuators.

72. The method of claim 71 wherein the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators.

73. The method of claim 71 wherein the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators; the substantially simultaneously and substantially in unison lifting of the ends of the support comprising forcing the gas into the individual actuators substantially simultaneously, and maintaining a substantially equal gas pressure at both actuators during the lifting.

74. The method of claim 71 wherein the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators; the forcing gas comprises flowing gas into the actuators through inlet lines and out of the actuators through outlet lines; and the method further comprising equilibrating gas in the outlet lines with ambient pressure during the lifting.

75. The method of claim 71 wherein:

the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators;

the forcing gas comprises flowing gas into the actuators through inlet lines and out of the actuators through outlet lines;

the substantially simultaneously and substantially in unison lifting of the ends of the support comprising forcing the gas into the individual actuators substantially simultaneously, and maintaining a substantially equal gas pressure at both actuators during the lifting; and

the maintaining a substantially equal gas pressure comprises equilibrating gas in the outlet lines with ambient pressure during the lifting.

76. The method of claim 71 further comprising, after the vertically displacing, removing the separated integrated circuit packages from over the support.

77. The method of claim 71 wherein the pins and board align such that each of the separated integrated circuit packages is retained to the support by at least one pin, the vertically displacing releasing the separated integrated circuit packages from the pins.

78. A method of forming integrated circuit packages, comprising:

providing a base having a plurality of pins extending upwardly therefrom;

providing a support over the base, the support having an upper planar surface and a pair of opposing ends, the support having a plurality of holes extending therethrough, the holes aligning with the pins, the pins extending through the holes and upwardly beyond the upper planar surface of the support;

providing a pair of actuators beneath the support, a first of the actuators being proximate one of the opposing ends and an other of the actuators being proximate the other of the opposing ends;

providing at least one panel over the support, the panel having a plurality of blocks extending upwardly therefrom, the blocks having upper surfaces;

providing a board having a plurality of integrated circuit components bonded thereto, the integrated circuit components extending outwardly from the board and forming a repeating pattern of integrated circuit packages across the board, the board having a plurality of holes extending therethrough;

placing the board over the panel, the pins extending into the holes in the board, the block upper surfaces supporting the board while leaving the integrated circuit components extending between the block upper surfaces and the panel;

while the board is over the panel, cutting the board to separate the integrated circuit packages from one another; and

after the cutting, vertically displacing the support by the actuators to lift the support off the pins, the vertically displacing comprising lifting both ends of the support substantially simultaneously and substantially in unison, the support upper planar surface remaining substantially level as the support is lifted off the pins by the actuators.

79. The method of claim 78 wherein the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators.

80. The method of claim 78 wherein the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators; the substantially simultaneously and substantially in unison lifting of the ends of the support comprising forcing the gas into the individual actuators substantially simultaneously, and maintaining a substantially equal gas pressure at both actuators during the lifting.

81. The method of claim 78 wherein the actuators are pneumatically powered and the vertically displacing the support comprises forcing gas into the actuators; the forcing gas comprises flowing gas into the actuators through inlet lines and out of the actuators through outlet lines; and the method further comprising equilibrating gas in the outlet lines with ambient pressure during the lifting.

82. The method of claim 78 further comprising, after the vertically displacing, removing the separated integrated circuit packages from over the support.

83. The method of claim 78 wherein the pins and board align such that each of the separated integrated circuit packages is retained to the support by at least one pin, the vertically displacing releasing the separated integrated circuit packages from the pins.

84. The method of claim 78 wherein the blocks are provided in a one-to-one correspondence with the integrated circuit packages.

85. The method of claim 78 wherein the providing the blocks comprises fastening the blocks to the panel.

86. The method of claim 78 wherein the blocks are one-piece with the panel.

87. The method of claim 78 wherein the pins do not extend through the panel.

88. The method of claim 78 comprising providing more than one panel over the support, each panel having blocks associated therewith.

89. The method of claim 88 wherein the providing a board comprises providing separate boards over the separate panels.

90. The method of claim 88 wherein the each of the panels and blocks associated therewith is a panel and block assembly, the panel and block assemblies all being identical to one another.

91. The method of claim 88 wherein the each of the panels and blocks associated therewith is a panel and block assembly, the panel and block assemblies all being identical to one another, and the blocks are provided in a one-to-one correspondence with the integrated circuit packages.